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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,607	05/15/2001	Tsuyoshi Nakajima	P20987	9197
7055	7590	04/05/2004	EXAMINER	
GREENBLUM & BERNSTEIN, P.L.C.			HUNG, YUBIN	
1950 ROLAND CLARKE PLACE			ART UNIT	
RESTON, VA 20191			PAPER NUMBER	

2625

DATE MAILED: 04/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/854,607

Applicant(s)

NAKAJIMA ET AL.

Examiner

Yubin Hung

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 May 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Drawings***

1. Figures 8, 9(a)-9(c) should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1-5, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doke et al. (US 6,134,342), in view of Mahdavi et al. (US 5,345,514).

4. Regarding claim 2, and similarly claim 1, Doke et al. discloses the following:

- an imaging system that images the object to be inspected [Fig. 7, numerals 37, 37, 59, 61, 71, 73; Col. 7, lines 46-63]
- an image capture system that stores the image as digital data [Fig. 7, numeral 73; Fig. 8, numerals ST1-ST5; Col. 9, line 60 – Col. 10, line 12. Note that to perform the operation of ST5 the existence of a memory, a buffer or their equivalent is inherent to hold the original image while the averaging operation of ST3 is being carried out]
- a region area detection system that analyzes the digital data stored by the image capture system to

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- determine an arc circumscribing a tip of each of the plurality of projected portions of the object  
[Fig. 7, numeral 73; Fig. 9; Col. 10, lines 29-30. Note that the circumscribing arc touches the tip of the projected areas of the circumscribed contour]
  - identifies overlapping regions formed between an inner portion of a region defined by the arc and a cut-away portion of the object, and determines an area of each of the overlapping regions  
[Fig. 7, numeral 73; Fig. 9. Note that area outside the circumscribed contour is considered the "cut-away" portion that is overlapped with the inside of the enclosing arc]
- a defect determination system that determines that no defect exists on the object when the area difference of each of the overlapping regions determined by the region area comparison system is within a range of predetermined criteria, and determines that a defect exists on the object when the area difference is outside the range of predetermined criteria  
[Fig. 7, numeral 73; Fig. 8, ST27; Col. 11, lines 50-51]

Doke et al. does not expressly disclose that the region area comparison system

- compares the area of each of the overlapping regions with the areas of the other overlapping regions to determine an area difference for each of the overlapping regions

However, Mahdavi et al. teaches comparing each repeated image pattern (an image of a slot in this case) with another to determine their area difference [Fig. 1, numerals 12, 14, 30; Fig. 2A, numerals 58-66, 76, 78. Note that after binarization the number of pixels of an image that have a value of 1 is its area].

Doke et al. and Mahdavi et al. are combinable because they are from the same field of endeavor of image-based inspection.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify Doke et al. with the teaching Mahdavieh et al. by comparing the images of the repetitive areas (e.g., slots or teeth of a gear). The motivation would be to have a defect detection process that is independent of defect size and shape and yet do not have to compare a large number of templates [Mahdavieh et al., Col. 1, line 59 – Col. 2, line 9].

Therefore, it would have been obvious to combine Mahdavieh et al. with Doke et al. to obtain the invention as specified in claim 2.

5. Regarding claim 5, Doke et al. further discloses

- a lighting box, on which the inspected object is placed, the imaging system being positioned opposite to an illuminating surface of the lighting box [Fig. 4]

6. Claims 3, 4 and 7 are identical to claims 1, 2 and 5, respectively except that each overlapping in question is with the *outer* portion of a region defined by an arc and a cut-away portion of an object and are therefore obvious variations of claims 1, 2 and 5, which are different aspects of the invention suggested by Doke et al. and Mahdavieh et al. combined. Consequently claims 3, 4 and 7 are similarly analyzed and rejected as per claims 1, 2 and 5, respectively

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7. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doke et al. (US 6,134,342) and Mahdavi et al. (US 5,345,514) as applied to claims 1-5, and 7 above, further in view of Knollenberg et al. (US 5,493,123).

8. Regarding claims 6, and similarly claim 8, Doke et al. and Mahdavi et al. disclose everything except the following:

- the imaging system comprises a band pass filter that filters out light having wavelengths other than the wavelengths of light used by the lighting box to illuminate the object

However, Knollenberg et al. teaches the use of a band-pass filter in a surface defect inspection system. [Abstract: lines 18-19.]

Knollenberg et al., Doke et al. and Mahdavi et al. are combinable because they are they are from the same field of endeavor of image-based inspection.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Doke et al. and Mahdavi et al. with the teaching of Knollenberg et al. by using of a band-pass filter. The motivation would be to eliminate ambient light [Knollenberg et al., Col. 4, lines 18-22].

Therefore, it would have been obvious to combine Knollenberg et al. with Mahdavi et al. and Doke et al. to obtain the invention as specified in claim 6.


**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (703) 305-1896. The examiner can normally be reached on 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yubin Hung  
Patent Examiner  
March 30, 2004

  
TIMOTHY M. JOHNSON  
PRIMARY EXAMINER